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[54] **METHOD AND APPARATUS FOR DEDUCING USER INTENT AND PROVIDING COMPUTER IMPLEMENTED SERVICES**

[75] Inventors: **William W. Luciw**, Morgan Hill; **Stephen P. Capps**, San Carlos; **Lawrence G. Tesler**, Portola Valley, all of Calif.

[73] Assignee: **Apple Computer, Inc.,** Cupertino, Calif.

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[56] **References Cited**

U.S. PATENT DOCUMENTS

4,670,848	6/1987	Schramm	395/60
4,736,296	4/1988	Katayama et al.	364/419
4,875,187	10/1989	Smith	395/141
4,918,723	4/1990	Iggulden et al.	379/100
4,945,504	7/1990	Nakama et al.	364/789.11
4,953,106	8/1990	Gansner et al.	395/160
4,974,191	11/1990	Amirghodsi et al.	395/275
5,068,802	11/1991	Miyashita et al.	395/133
5,091,790	2/1992	Silverberg	358/434
5,103,498	4/1992	Lanier et al.	395/68
5,109,509	4/1992	Katayama et al.	395/600
5,123,103	6/1992	Ohtaki et al.	395/600

FOREIGN PATENT DOCUMENTS

0441089A2	8/1991	European Pat. Off.	G06F 3/023
1130291	5/1989	Japan	G06K 9/03

OTHER PUBLICATIONS

Roh et al.; *Artificial Intelligence;* 1991 2nd ed.; McGraw-Hill, Inc.; pp. 41–44, 302, 303.
Microsoft Windows User's Guide for the Windows Graphi-cal Environment; version 3.0; Microsoft Corporation; 1985–1990; pp. 1–75, 99–142, 355–387.
Microsoft MSDOS Operating System User's Guide; ©1982, 1983; pp. 4–1 to 4–16 and 5–1 to 5–19.
Wilensky et al.; "Talking to UNIX in English"; *Communications of the ACM;* Jun. 1984; V27 N6; pp. 574–593.
Tello; "Natural Language Systems"; *Mastering AI Tools and Techniques;* ©1988.
Wiener; "Three Weeks that Did Not Reorganize My Life"; *U.S. News & World Report;* v 106 p. 76(2), Feb. 1989; Dialog 07010300.

(List continued on next page.)

Primary Examiner—Roy N. Envall, Jr.
Assistant Examiner—Stephen R. Tkacs
Attorney, Agent, or Firm—Hickman & Beyer

[57] **ABSTRACT**

A method for deducing user intent and providing computer implemented services characterized by the steps of: a) noticing a significant new event occurring within the computer system; b) deducing an intent from the significant new event and from the context in which the new event occurred; and c) providing a service based upon the new event and its context. Significant events are those which the computer might be able to assist a user, and can be determined by matching the event into a database of recognizable events to make a significant observation. The deduction step takes a delimited set of significant observations and attempts to match the set against a number of intent templates. If there are multiple matches to the intent templates, the matches are ranked and a best guess is made to determine a deduced intent. Service is provided fulfilling all preconditions of a plan associated with the deduced intent, and by sequentially executing the steps of the plan. The apparatus of the present invention implements the method on a pen-based computer system.

10 Claims, 18 Drawing Sheets